REMARKS

Rejections under 35 U.S.C. §103

Claims 14 and 16 stand rejected as allegedly being obvious over Yamazaki (US 6,133,119) in view of Ichinose (US 5,688,366), Skorupski et al (US2002/0162218) and Klien (DE10101926). Claims 2-4, 6-8, 10-12, 19-24 and 26-28 stand rejected as allegedly being obvious over Skorupski et al (US2002/0162218) in view of Klien (DE10101923) and Yamazaki (US 6,133,119). Claim 25 stands rejected as allegedly being obvious over Skorupski et al in view of Klien, Yamazaki and further in view of Ohlsen (US 6,641,948).

Even the combination of references fails to teach the present invention. None of the cited references teach or suggest a printable thickened etching paste having from 10-90 % by weight of a solvent which is a mixture of water and at least one other solvent. As previously discussed, Applicants have discovered that significant drawbacks can be avoided, if water is used as a solvent together with a further organic solvent.

Yamazaki (US 6,133,119) is concerned with increasing the roughness of the upper surface of a silicon substrate and thus, the depth of etching is not a consideration. Selective etching is also not a consideration. Yamazaki etches with 2% NaOH aqueous -but not thickened- solution at 80 °C. The etching takes place for 5 min and a roughness of about 0.1 to 5 µm is achieved (see column 11, lines 44 - 64). After the rough etch a conductive silicon layer is formed on top. Thus, the reference only discloses a method and a liquid composition for roughening a silicon surface to form uneven textures. In contrast, an aim of the present invention is primarily to selectively remove material from the treated silicon surface and to get even surfaces.

Furthermore, the method of present the application is carried out using a thickened composition, the diffusion mechanism of the etchant in a thickened, thixotropic solution is entirely different from that in a liquid composition, not only are the etching results entirely different but in order to achieve good results the medium has to be activated by the input of energt. Furthermore, the etching process consumes significantly reduced amount of etching chemicals since the etching paste is only applied to the areas to be etched.

As noted in the previously submitted declaration under 37 CFR 1.312, the compositions of Yamazaki can not acheive etching depths of 1-3 µm. Rather a depth of only .02 µm is achieved. This invention achieves selective etching to depths of 1- 3 µm.

A skilled worker looking to Yamazaki for guidance would recognize that after roughening any further metal deposition will not be optimal and circuit lines cannot be carried out properly. In contrast, the compositions of the present application are printable in very even homogenous etched lines to depths of 1- 3 µm. This is very important for the subsequent deposition of metallic circuits into the etched lines. In no way does Yamazaki teach this.

A skilled worker would recognize that an etchant must be adapted to the surface which it will etch and would not look to Ichinose et al. (US 5,688,366) for guidance on etching silicon. Itchinose etches transparent conductive film (SnO_2, InO_3, ITO) with a solution that is mixed together with fine macromolecular resin particles to form a paste (see col. 3 at lines 36-43). All of the examples use acidic etching compositions (concentrated sulfuric acid, concentrated hydrochloric acid or ferric chloride). Particulates can not be applied homogeneously to the surface to be etched and result in a very irregular etching profile. Thus, even if a skilled worker were motivated to combine Yamazaki with the particulate thickeners of Ichinose, which they are not, the result would be uneven, irregular, roughened lines and would not result in etching depths of

depths of 1-3 µm. In contrast, the compositions of the present application leads to homogeneous even etched lines. Furthermore, as discussed in the delaration previously submitted, the compositions of Ichinose only achieved etching depths of 0.1- 0.13 µm. This invention achieved depths of 1-3 µm.

Ichinose offers no way to overcome the deficiencies of Yamazaki. Ichinose is silent regarding the etching of silicon surfaces such as those used by Yamazaki and employs an acid etchant with a completely different reactive chemistry from that of Yamazaki.

Thus, a skilled worker would not have combined the teaching of Yamazaki with Ichinose. Neither reference teaches or suggests an etching medium that is printable according to the present invention or suitable for the selective etching of fine lines to depths of 1-3 µm. Nor do they teach or suggest compositions comprising a mixture of solvents (i.e., water and at least one of the different organic solvents) for achieving this purpose. Therefor, the combined teachings do not meet all of the elements of the claimed invention.

The Examiner relies upon Skorupski for teaching NaOH etching mediums possessing between 8 and 16%wt NaOH. Like Ichinose, Skorupski (US 2002/0162218) does not etch silicon surfaces. Skorupski teaches the manufacture of printed circuit boards having improved interlayer adhesion and generally teaches a skilled worker how to roughen the surfaces of metal foils, not silicon surfaces. The physical properties of silicon and polyimide are entirely different and a skilled worker would not look to an etchant for polyimide to etch silicon (see Example 27). Substrates are chemically etched by running them through a solution (see Example 7). Like Yamazaki, the etching mediums of Skorupski roughen the substrate surfaces in order to achieve a better adhesion of interlayers. Also like Yamazaki and Ichinose, Skorupski does not teach or suggest a mixture of solvents (i.e., water and at least one other organic solvent). Moreover, the etching mediums of Skorupski

are not printable and do not provide selective etching to a depth of 1-3 µm.

As can be seen in the declaration submitted on 2 October 2009, even at elevated temperatures the composition of Skorupski resulted in very weak etching depths of 0.3 µm. Furthermore, the compositions of Skorupski do not result in enhanced silicon edge isolation. Thus, unlike the present invention, any subsequent metal deposition will not be optimal and the circuit lines cannot be carried out properly. As noted above, a homogeneous and even depth of etch is very important for the subsequent deposition of metallic circuits into the etched lines.

Even if a skilled worker were to use the NaOH etchant of Yamazaki and Skorupski in a thickened form they would still not achieve selective etching. The Examiner relies upon Klein (DE10101926) for teaching the addition of a thickener for making an etching solution a paste (see page 4 of English translation). Klein does not cure the deficiences of the above discussed references. Klien uses fluoride based etchants (e.g., fluoride, bifluoride or tetrafluoroborate as etchants) optionally in combination with mineral acids and/or organic acids. In addition, Klein's compositions contain a buffer like lactat or H_3PO_4. On page 3 of the translation, Klein teaches numerous individual solvents and classes of solvents and states that they may be mixtures. However, there is nothing which would lead a skilled worker to choose from amoung the 36 specific solvents listed or any of the hundreds of possible solvents from among the classes of solvents to arrive at a mixture of water with another solvent. As noted in the previously submitted declaration, Klien only achieves an ethching depth of 0.12 µm. Klien does not teach or suggest the selective etching of silicon surfaces to a depth of 1-3 µm. A skilled worker would not look to Klien to modify the teachings of the other references because Klien discloses etching solutions for entirely different surface chemistires with entirely different active ingredients. These surface have active ingredients that are also different from the surfaces of the present invention.

Ohlsen (US 6,641,948) discloses the application of a photoresist layer to protect areas from the subsequent application of an aqueous 30 % KOH solution. Ohlsen is silent regarding a printable etching paste. An aqueous etching solution is not comparable with the printable compositions of the present application. Ohlsen does not cure the deficiences of Skorupski or the other references. None of the references teach or suggest a printable thickened etching paste having a mixture of solvents comprising water and at least one other organic solvent. Furthermore, they are silent regarding exposure times and do not achieve the recited line depths.

Since the method of present the application is carried out using a thickened composition, the diffusion mechanism of the etchant in a thickened, thixotropic solution is entirely different from that in a liquid composition, not only are the etching results entirely different but in order to achieve good results the activating temperature has to be different as well. Furthermore, the etching process consumes significantly reduced amount of etching chemicals since the etching paste is only applied to the areas to be etched.

In determining whether references can be combined, their teachings as a whole must be considered. In this case, the Examiner picks elements from numerous individual references and combines them together. All of the cited references disclose different etching compositions for different applications. Applicants submit that if one condition or ingredient changes the whole composition must be adapted, particularly if one is trying to achieve a specific homogenous etching depth. Clearly, appellants' disclosure is impermissibly being used as a template to assert obviousness. See. e.g., *In re Fritch* 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992) where the court stated:

> It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious." This court has previously stated that "[o]ne cannot use **hindsight** reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention"

Consequently, Applicants respectfully submit that there is insufficient motivation to combine the teachings of the cited references, and these rejections should be withdrawn. Furthermore, even the combination of references fails to teach the present invention since none of the cited references teach or suggest a printable thickened etching paste having from 10-90 % by weight of a solvent which is a mixture of water and at least one other solvent.

Thus, based on the above remarks it is respectfully requested that the rejection under 35 U.S.C. §103 be withdrawn.

No fee is believed to be due with this response, however, the Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

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